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Cancer Incidence in Rhode Island Cities and Towns, 1987-2000

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Since the recording of its first cancer case reports in October 1986 the Rhode Island Cancer Registry (RICR) of the Rhode Island Department of Health has been asked by various sources to produce cancer incidence rates for municipalities. Doing so requires at least ten years of cancer case reports and appropriate population data from censuses of the state's population. With the recent release of detailed demographic information for municipalities from the United States Census of 2000, it has become possible for the first time to produce cancer incidence rates for the 39 cities and towns of Rhode Island.

Methods. Counts of malignant neoplasms diagnosed between January 1, 1987, and December 31, 2000, categorized by age, sex, anatomical site, and municipality were prepared from cancer case reports made to the RICR. Municipality of residence at diagnosis was ascertained from three separate data fields: municipality, census tract, and zip code. Of 76,327 cases of malignant neoplasms diagnosed between January 1, 1987, and December 31, 2000, municipality of residence at diagnosis could be ascertained unambiguously in 97%. Another 0.2% included place names and corresponding zip codes that overlap more than one municipality. In these cases, the municipality identified as "primary" for the zip code by the United States Postal Service was selected for use, or absent this information, the largest municipality associated with the place. The remaining cases (slightly less than three percent) contained no useful information on municipality of residence at diagnosis. To avoid underestimating incidence rates, these cases were randomly assigned to municipalities in proportion

to the estimated populations of the municipalities for 1994.

Counts of the Rhode Island population by age, sex, and municipality were obtained from publications of the 1990 and 2000 United States Censuses of Population.¹ Analogous counts were estimated for the years 1991-1999 by linear interpolation, and for the years 1987-1989 by linear projection, using data from the two censuses.

Age-adjusted sex-specific statewide and municipal cancer incidence rates were calculated from cancer case reports, actual and estimated counts of the Rhode Island population, and the Year 2000 United States Standard Population.² Rates were calculated for all cancers combined and for the four most common malignancies, cancers of the colon-rectum ("colon"), lung-bronchus ("lung"), prostate (males only), and breast (females only).

Results. The statewide age-adjusted cancer incidence rate for all cancers combined is 601.4 per 100,000 among males and 435.7 per 100,000 among females. (Table 1) By municipality, rates among males vary from 449.0 for Exeter to 726.1 for East Greenwich, with a standard deviation of 59.2 over the 39 cities and towns. (Table 1) Municipal cancer incidence rates for all cancers combined among females vary from 331.8 for Richmond to 512.4 for Hopkinton, with a standard deviation of 39.8 over the 39 cities and towns.

Measured relative to statewide incidence rates, the standard deviations of the municipal rates for all cancers combined were 9.8% for males and 9.1% for females. (Table 2) Municipal cancer incidence rates for the four most common site-specific cancers vary more widely over 39 cities and towns. Their standard deviations range from 15.8% to 22.6% of the corresponding statewide rates.

Table 1. Age-adjusted, sex-specific statewide and municipal cancer incidence rates per 100,000, Rhode Island, 1987-2000.								
	----- Males -----				----- Females -----			
Municipality	Colon	Lung	Prostate	All*	Colon	Lung	Breast	All*
State	82.6	105.8	153.0	601.4	56.4	54.3	130.6	435.7
Barrington	81.1	87.9	173.3	581.4	49.8	42.1	146.4	436.5
Bristol	79.3	101.0	143.5	576.6	49.2	36.5	129.7	375.7
Burrillville	89.9	110.9	146.1	556.4	61.2	42.8	113.6	383.8
Central Falls	83.3	147.5	117.4	621.4	55.0	59.0	101.7	398.4
Charlestown	51.9	82.8	224.7	629.9	46.8	75.5	138.9	472.3
Coventry	85.2	124.3	149.7	607.0	61.6	52.9	134.3	445.5
Cranston	86.1	100.6	142.1	592.1	56.5	52.3	135.1	431.0
Cumberland	76.9	81.9	161.1	545.6	66.0	42.5	135.2	429.2
East Greenwich	90.6	105.8	240.4	726.1	68.7	42.3	175.2	508.5
East Providence	82.8	109.1	146.5	591.7	62.1	49.8	127.1	438.6
Exeter	51.0	98.0	125.3	449.0	52.1	51.5	120.7	427.8
Foster	57.2	86.6	175.0	590.6	40.8	71.0	163.5	454.3
Glocester	43.2	73.6	129.1	449.3	44.1	52.6	96.8	354.8
Hopkinton	102.5	100.7	176.9	669.3	61.5	62.6	151.3	512.4
Jamestown	45.8	80.2	196.3	623.6	58.9	66.0	152.4	476.3
Johnston	85.4	113.6	140.0	604.2	58.5	56.0	147.1	468.6
Lincoln	79.2	90.1	150.1	567.5	49.2	36.3	114.9	365.0
Little Compton	65.2	108.1	169.5	587.2	29.2	39.7	141.1	422.0
Middletown	70.6	111.7	236.1	693.8	58.3	70.2	146.4	472.2
Narragansett	77.1	84.9	198.2	579.0	68.7	54.6	130.6	457.6
New Shoreham	20.8	81.9	188.3	636.6	0.0	60.4	174.3	394.0
Newport	76.4	107.3	247.6	716.6	58.3	72.4	139.9	480.9
North Kingstown	96.4	102.2	207.8	706.0	50.9	61.9	139.1	470.7
North Providence	89.4	103.0	124.9	594.2	51.1	56.1	131.8	425.0
North Smithfield	72.7	77.5	118.4	523.7	64.6	45.0	115.8	431.0
Pawtucket	94.5	113.1	130.8	605.0	55.7	52.7	123.2	428.1
Portsmouth	87.4	97.1	202.3	598.5	63.1	62.4	153.1	468.0
Providence	72.2	111.6	136.7	588.7	53.2	56.7	123.2	435.5
Richmond	89.6	102.0	178.5	671.3	47.9	64.4	75.2	331.8
Scituate	66.2	125.2	176.7	602.1	51.6	42.1	167.3	438.1
Smithfield	74.2	93.9	151.8	581.3	54.4	59.5	130.0	435.3
South Kingstown	67.9	99.5	187.0	608.0	56.0	57.0	149.4	447.6
Tiverton	76.1	84.0	149.4	531.3	49.2	46.3	104.1	377.2
Warren	82.1	98.7	137.5	575.7	53.4	59.1	130.6	427.0
Warwick	89.8	114.1	156.8	637.9	57.8	65.1	133.7	460.8
West Greenwich	91.2	137.3	182.0	637.6	46.6	93.6	109.5	475.5
West Warwick	103.8	125.3	144.1	649.9	57.1	59.7	123.3	440.5
Westerly	78.5	89.7	174.0	625.1	61.1	46.8	127.3	433.7
Woonsocket	102.6	121.0	125.5	608.7	59.1	53.0	119.2	425.0

* All cancers combined

Table 2. Statewide cancer incidence rates per 100,000 and standard deviations of municipal rates, Rhode Island, 1987-2000.						
	----- Males -----			----- Females -----		
Site	Statewide Rate	Standard Deviation	SD as % of State Rate	Statewide Rate	Standard Deviation	SD as % of State Rate
Colon	82.6	17.5	21.1%	56.4	11.8	20.8%
Lung	105.8	16.7	15.8%	54.3	11.8	21.8%
Prostate	153.0	34.6	22.6%	--	--	--
Breast	--	--	--	130.6	20.8	15.9%
All*	601.4	59.2	9.8%	435.7	39.8	9.1%

* All cancers combined

Table 3. Statewide and municipal cases of diagnosed cancer, Rhode Island, 1987-2000.

	----- Males -----				----- Females -----			
Municipality	Colon	Lung	Prostate	All*	Colon	Lung	Breast	All*
State	5132	6820	9849	38346	5420	4793	10881	37981
Barrington	88	95	185	623	68	59	196	587
Bristol	122	167	244	936	108	74	231	720
Burrillville	75	94	120	473	80	49	128	454
Central Falls	76	137	106	576	93	84	144	579
Charlestown	24	41	110	305	26	44	75	256
Coventry	151	232	274	1121	163	136	336	1132
Cranston	472	561	814	3291	491	396	979	3280
Cumberland	149	171	322	1086	191	121	353	1157
East Greenwich	67	76	173	535	71	42	177	517
East Providence	296	404	543	2125	376	266	626	2302
Exeter	13	28	33	131	18	18	41	148
Foster	13	19	42	141	12	18	48	129
Glocester	20	41	56	217	23	29	61	208
Hopkinton	37	42	66	262	31	31	75	255
Jamestown	14	30	73	216	26	29	66	205
Johnston	166	229	285	1195	176	149	372	1248
Lincoln	109	131	218	803	102	72	198	672
Little Compton	18	28	48	159	10	14	43	132
Middletown	68	113	236	702	96	101	201	680
Narragansett	66	75	174	517	73	62	139	496
New Shoreham	2	6	14	45	0	6	13	31
Newport	111	158	361	1064	141	161	285	1043
North Kingstown	127	143	281	972	96	116	260	882
North Providence	220	259	317	1458	196	195	429	1440
North Smithfield	56	60	93	406	79	46	114	453
Pawtucket	427	518	607	2760	406	353	761	2777
Portsmouth	83	105	200	611	81	83	199	609
Providence	585	911	1127	4860	717	668	1394	5238
Richmond	23	30	47	177	14	17	27	107
Scituate	42	78	111	382	37	31	122	318
Smithfield	87	112	178	687	105	99	203	728
South Kingstown	90	135	252	820	105	97	253	781
Tiverton	82	89	158	563	64	61	133	481
Warren	66	82	116	474	68	67	138	477
Warwick	515	698	949	3788	518	549	1058	3775
West Greenwich	16	25	32	123	8	19	31	112
West Warwick	170	233	258	1144	145	144	281	1053
Westerly	120	139	281	976	141	96	239	876
Woonsocket	266	325	345	1622	265	191	452	1643

* All cancers combined

— Health by Numbers —

Discussion. Cancer is a major cause of morbidity and mortality in Rhode Island, as it is in the United States as a whole. About four out of every 10 people in Rhode Island will develop cancer sometime in the course of their lives, and half of those will die of the disease. Close to 4% of the state's population (nearly 40,000 people) suffer from cancer at any one time.

Cancer is considered a public health problem because some cancers are preventable, and others controllable, through environmental or population-based interventions. For this reason, the United States³ and Rhode Island⁴ both have established clearly articulated cancer control objectives for their populations.

Among the many different forms of cancer that beset humans, cancers of four anatomical sites clearly predominate in the United States: 1) cancer of the colon, 2) cancer of the lung, 3) cancer of the prostate (males), and 4) cancer of the breast (predominantly females). Of these four, the first two are largely preventable, and the last two are more easily controlled if identified as small tumors. For this reason, all four figure prominently in cancer control objectives, using population-based prevention and early detection strategies proven to be effective in research studies.^{3,4}

The relative effect of proven cancer control interventions from place to place may be examined by comparing cancer incidence rates computed from cancer registry data. Examining differentials in cancer incidence rates by municipality, for example, may be helpful in targeting local cancer control interventions. For example, municipalities with high lung cancer incidence rates might consider targeting the reduction of tobacco use, while those with high colorectal incidence rates might consider ways of increasing the proportion of eligible persons receiving endoscopic exams of the colon. On the other hand, municipalities with low prostate cancer incidence rates or low breast cancer incidence rates

might consider ways of promoting screening tests for these cancers.

A caution that should be observed in comparing rates across geographic entities with small populations is that random factors (factors unrelated to the cause of cancer or their control) are more likely to influence cancer incidence rates in smaller populations, where the numbers of cases are relatively small, than in larger populations. (Table 3) Nonetheless, when interpreted judiciously, municipal cancer rates serve as a good introduction to more comprehensive thinking about the factors that cause and reduce the cancer burden (incidence, prevalence, and mortality) across geographic areas.

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